

***FINAL  
SERIOUS AREA OZONE  
STATE IMPLEMENTATION PLAN  
FOR  
MARICOPA COUNTY***



***Air Quality Division  
Arizona Department of Environmental Quality***

***December 2000***

**SERIOUS AREA OZONE STATE IMPLEMENTATION PLAN  
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# Serious Area Ozone Plan for the Maricopa County Nonattainment Area

## Executive Summary

The 1990 federal Clean Air Act Amendments (CAA) established attainment dates and planning deadlines for those areas not meeting the National Ambient Air Quality Standards (NAAQS) for the criteria pollutants.<sup>1</sup> The term nonattainment area refers to locations that exceed any NAAQS for any r: criteria pollutant based upon the data collected through air quality monitoring. The Maricopa County nonattainment area was originally classified as a "moderate" ozone nonattainment area, and was reclassified to "serious" on December 8, 1997, with an attainment date of November 15, 1999 (see 62 FR 60001, November 6, 1997). The Maricopa County nonattainment area has now completed its 3rd straight year (1997-1999) of no monitored exceedances of the 1-hour ozone NAAQS and is submitting this Serious Area Ozone Plan in accordance with the CAA, Title 1, Part D and EPA guidance.<sup>2</sup> For serious ozone nonattainment areas, the Plan requirements are found in CAA§ 182(c). The EPA guidance is in Appendix D. As required by section 182(c) and the guidance, Arizona has in place:

- Approved 15% Rate of Progress Plan for volatile organic compounds (VOC) (see 63 FR 28848, May 27, 1998; 64 FR 36243, July 6, 1999 (modification))
- Approved Reasonably Available Control Technology (RACT) rules for sources identified in CAA § 182(a)(I)(a) and (b)(2).
- Approved Gasoline Vapor Recovery Program
- Approved Maricopa County 1990 Base Year Inventory (see 63 FR 28898, May 27, 1998)
- Approved Enhanced Vehicle Inspection and Maintenance Program
- New Source Review (NSR) provisions
- Approved Reformulated Gasoline Program
- Transportation Control Measures Program

This Plan also includes:

- The Maricopa County 1996 Base Year Inventory
- Photochemical Assessment Monitoring Stations (PAMS) Network Plan

Based on Maricopa County's 1996 emissions inventory, the primary sources of ozone formed by the ozone precursors VOCs and NO<sub>x</sub> are: Onroad Mobile (automobiles and trucks); Nonroad Mobile (utility lawn and garden, construction, farm, and recreational equipment; aircraft; and locomotives); Area Sources (service stations, dry cleaners, and autobody shops); Point Sources (industrial

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<sup>1</sup> The CAA specified the criteria pollutants to be carbon monoxide, nitrogen oxides, lead, sulfur dioxides, ozone, and particulates.

<sup>2</sup> A memorandum from John Seitz, Director, Office of Air Quality Planning and Standards, EPA, dated May 5, 1995, details EPA's interpretation of certain requirements of subparts 1 & 2 of part D of Title 1 of the CAA for areas that have 3 consecutive years of monitored attainment.

manufacturing and electrical power generation facilities); and Biogenic Sources (emissions from living vegetation). The Maricopa County's 1996 base year (July through September 1996) ozone inventory is in Appendix E.

Chapter 1 gives an overview of the area's air quality and the factors affecting ozone formation.

Chapter 2 describes in detail the RACT rules designed to control emissions of VOCs, the PAMS Network Plan implementation, the NSR provisions previously submitted to EPA, and the other required elements of a serious area plan. Chapter 3 contains a summary of the Maricopa County 1996 Base Year Inventory, listing sources in the nonattainment area and their VOC emissions.

The Serious Area Ozone Plan will be followed by the submittal of the Ozone Maintenance Plan and redesignation request. Collectively, ADEQ, Maricopa County Environmental Services Department (MCESD) and the Maricopa Association of Governments (MAG) have and will continue their aggressive approach to maintain the I-hour ozone NAAQS for the Maricopa County nonattainment area.

## **CHAPTER 1      Existing Air Quality**

### **1.0      Introduction**

Ozone is an air pollutant formed by the chemical reaction of volatile organic compounds (VOCs) and nitrogen oxides (NOx) in the presence of sunlight. Ozone measured near ground level is not emitted directly into the atmosphere, but, rather is formed as a result of chemical reactions in the atmosphere, so is classified as a "secondary" pollutant. It is also considered a "regional scale" pollutant because it occurs over a wider area than that in which the precursor pollutants are emitted; peak levels are often found many miles or more downwind of the sources. Ozone affects the respiratory tract: asthma, bronchitis and other respiratory disorders are worsened by high ozone levels. Children are more adversely affected than adults. Eye irritation, nausea, headaches, coughing and dizziness are other symptoms of unhealthful ozone exposure. Ozone can also interfere with photosynthesis, thereby damaging plants, natural vegetation, and agricultural crops.

Ozone concentrations are highest during the summer, between mid-day and late afternoon. The ozone "season" in the Maricopa County nonattainment area begins in May and extends through September. The Maricopa County nonattainment area has had no exceedances of the 1-hour ozone National Ambient Air Quality Standard (NAAQS) of 0.12 parts-per-million (ppm) since 1996. Violations of the 1-hour ozone NAAQS occur if the average number of ozone exceedances measured at a given air monitoring station, over 3 continuous years, exceed 1. Four exceedances measured during a 3-year period at a single air monitoring station equal 1 violation of the ozone NAAQS.

### **1.1      Climate of the Greater Phoenix Metropolitan Area**

Phoenix is located at 33.5° north latitude in a zone of summertime subtropical high pressure characteristic of desert environments. This high pressure results in the hot, dry, and generally clear sky conditions that are common throughout the region. Annual rainfall in this region is on the order of seven inches. Approximately half of the annual rainfall occurs in the winter season and is associated with passage of Pacific cold fronts through Arizona. The "monsoon" period, from July through September, accounts for most of the remaining half. High pressure also results in generally light winds that are localized and terrain influenced, rather than controlled by larger-scale pressure gradients.

#### **1.1.1      Summertime Climate**

During the ozone season (May through September), the region experiences two distinct climatic systems: pre-monsoon and monsoon. For the months of May and June (pre-monsoon) the atmosphere is very dry, resulting in hot afternoon temperatures, cool evening temperatures and virtually no precipitation. From July through September (monsoon), high pressure shifts over the Four Corners region and allows significant amounts of tropical moisture to move into

Arizona from regions to the south. The increased moisture results in strong convective thunderstorm formations over Arizona. Thunderstorms form over the highest terrain and propagate toward the Maricopa County area, usually arriving during the early evening hours. Afternoon temperatures are still hot, evening temperatures are warm and precipitation can be a daily occurrence. Despite the atmospheric moisture conditions, clear skies are predominant during morning and afternoon during the ozone season, providing ample sunlight for ozone formation.

## **1.2 Local Wind Pattern**

The Maricopa County nonattainment area is situated in the broad Salt River Valley, bounded, by mountains to the north and south. The orientation of the Valley is generally east-west; however, southward-flowing tributary drainages connect with the Salt River on the east and west boundaries of the greater Phoenix area. These tributaries have a significant role in the direction of air flow over Phoenix.

The most significant terrain, in terms of elevation and influence on local wind flow, is located to the north and east of the Phoenix area (*i.e.*, New River, Mazatzal, and Superstition Mountains). During the morning and afternoon, sunlight warms this terrain causing the air immediately above it to rise. Air from the lower elevations flows in the direction of the higher terrain to replace the rising air. In Phoenix, this "valley" breeze (up-valley flow) usually begins around noon with a west wind that persists until midnight. The confluence of the Verde and Salt Rivers, located on the eastern boundary of the Maricopa County nonattainment area, provides a slope change where the west wind over Phoenix will shift to a southerly direction up the Verde River.

After sunset, under clear sky conditions, the surface undergoes radiative cooling, lowering the temperatures of the air above it. The highest elevations cool most quickly. The colder, more dense air flows downslope and into the valleys. The "mountain" breeze (drainage wind or down-valley flow) generally produces lighter winds (~ 5 mph) than the valley breeze (~ 10 mph), and tends to follow more closely the actual watershed drainage channels. Drainage winds are out of the east for most of Phoenix; however, northerly flow does occur along the east and west boundaries of the region due to the Verde and Agua Fria drainages. The onset of drainage winds to the Phoenix area begins about midnight and lasts until noon, when the reversal to up-valley flow takes over.

The systematic mountain-valley circulation over the nonattainment area directs the timing and geographic distribution of ozone and its precursors. Early morning commuter emissions are slowly transported to the west by drainage winds. By afternoon, the flow is reversed and emissions are advected to the east, back over the central region, entraining additional surface emissions. During this period of ample sunlight and precursor emissions, the conditions are conducive for ozone formation. As the day progresses into late afternoon, ozone continues to build and is further transported toward the higher terrain, resulting in the maximum ozone concentration typically monitored east or north of the central region.

Peak monitored ozone concentrations over the central region to the west are frequent but can occur when there is a breakdown in the local circulation pattern. Wind patterns that can lead to this are persistent light to non-existent winds with little transport capabilities, drainage winds that last into the afternoon, or larger-scale atmospheric pressure patterns that provide light winds with an easterly component.

### **1.3 Air Quality Monitoring Network**

The 1990 Federal Clean Air Act Amendments (CAA) included a provision requiring more comprehensive and representative data on ozone air pollution. The CAA called for new regulations - for enhanced monitoring of ozone, its photochemical precursors, and meteorology. The revised regulations call for the establishment of Photochemical Assessment Monitoring Stations (PAMS) in ozone nonattainment areas classified as serious, severe, or extreme.

The State of Arizona has implemented a PAMS program as required by 40 CFR Part 58 as amended (February 12, 1993). The PAMS network joins the existing NAMS/SLAMS monitoring network that monitors ambient levels of criteria pollutants, non-criteria pollutants, and meteorological parameters. The PAMS network description is in Appendix C.



## **CHAPTER 2      Clean Air Act Requirements**

### **2.0.    Serious Area Ozone State implementation Plan Requirements**

The following requirements are referenced from applicable sections of the 1990 Clean Air Act (CAA), Title 1, Part D<sup>1</sup>

- A.    15% Rate of Progress Plan -CAA § 182(b)(I)(A)
  - EP A has determined that the Maricopa County nonattainment area has sufficient control measures in place to meet the 15 % rate of Progress (ROP) requirement in the CAA (see 63 FR 28898, May 27, 1998). On July 6, 1999, EPA finalized a rule to make minor changes to the FIP (see 64 FR 36243, July 6, 1999), noting that these changes did not affect the conclusion that the 15% Rap requirement was met.
- B.    Reasonably Available Control Technology (RACT) -CAA § 182(b)(2)
  - Maricopa County's rules and permits establishing RACT requirements for sources subject to RACT under Subpart 2 are identified in Section 2.2.
- C.    Gasoline Vapor Recovery -CAA § 182(b)(3)(A)
  - EP A approved the SIP revision for Arizona's Stage II Vapor Recovery Program effective January 3,1995 (see 59 FR 54521, November 1, 1994).
- D.    1990 Base Year Inventory -CAA § 182(a)(1)
  - EPA has approved the VOC and NO<sub>x</sub> baseline emissions inventory for the Maricopa County area (see 63 FR 28898, May 27, 1998).
- E.    Comprehensive and accurate current inventory --CAA § 182(a)(3)
  - The 1996 base year ozone inventory is contained in Chapter 3.
- F.    Enhanced Vehicle Inspection and Maintenance Program -CAA § 182(c)(3)
  - ADEQ has conducted a vehicle emissions inspection program since 1976 and an enhanced program since 1995 (see 60 FR 22518, May 8, 1995).
- G.    New Source Review (NSR) provisions -CAA § 182(c)(6), (7) and (8)
  - Maricopa County and ADEQ's NSR programs were submitted to EPA for approval in August 1994.

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<sup>1</sup> CAA§ 182( c) requires serious area plans to include all of the elements of plans for marginal and moderate areas established by CAA§ 182(a) and (b). Thus, this chapter refers to all three subsections when identifying the required elements of a serious area SIP

- H. Enhanced Monitoring --CAA § 182(c)(1)
  - Photochemical Assessment Monitoring Stations (PAMS) Network Design Plan per 40 Code of Federal Regulation (CFR) Part 58.
- I. Cleaner Burning Gasoline Program as an Alternative to the Clean-Fuel Vehicle Program CAA §182(c)(4)(B)
  - EP A has approved the Cleaner Burning Gasoline (CBG) program in Maricopa County (see 63 FR 6653, February 10, 1998).

In addition to the above requirements, Appendix A includes a list and provides a summary of ozone control measures that have contributed to attainment in the Maricopa County nonattainment area. The list is not exhaustive. Rather, a complete list of control measures will be included in the maintenance plan as part of the demonstration required by CAA §107(d)(3)(E)(iii) that "the improvement in air quality is due to permanent and enforceable reductions in emissions..."

## **2.1 15% Rate of Progress Plan-- CAA § 182(b)(1)(A)**

As required by section 182(b)(1)(A) of the CAA for moderate or above ozone nonattainment areas, ADEQ submitted the Maricopa Association of Government's (MAG) 1993 Ozone Plan for the Maricopa County Area to EPA on November 15, 1993, and an Addendum in April 1994. The Modeling Attainment Demonstration for the 1993 Plan was subsequently submitted in November 1994, and in April 1995, the revisions to the modeling Attainment Demonstration were submitted. EPA determined the submissions to be complete on May 12, 1995. EP A then promulgated a Federal Implementation Plan (FIP), which became effective June 26, 1998 (see 63 FR 28898, May 27, 1998). The FIP demonstrated the 15 % Rate of Progress (ROP) goal would be met by April 1, 1999, the earliest date practicable. On July 6, 1999, EP A finalized a rule to make minor changes to the FIP (see 64 FR 36243) but this action did not alter the conclusion in the 1998 FIP that the 15% ROP requirement was met.

## **2.2 VOC CTG/RACT rules-CAA § 182(a)(2)(A) and (b)(2)**

Under CAA § 182(a)(2)(A) and (b)(2) a SIP for moderate and above ozone nonattainment areas must include RACT for the following source categories:

- A. Source categories for which RACT "fix-up" rule revisions were required under EPA guidance issued before the 1990 CAA Amendments.
- B. Source categories covered by control technique guidelines (CTGs) issued between November 15, 1990 and the date of attainment.
- C. Source categories covered by control technique guidelines (CTGs) issued before November 15, 1990.
- D. All other major sources. For a serious nonattainment area, sources with the potential to emit 50 tpy or more of VOCs are considered major.

Maricopa County has adopted rules or issued permits including RACT requirements for these sources as indicated below. Many of these rules [and permits] already have been approved or proposed for approval by EPA.

### 2.2.1 Source Categories Subject to RACT "Fix-Up" Rule Revisions-CAA § 182(a)(2)(A)

Source Category	Maricopa County Rule	Status as SIP Revision
Architectural Coatings	Maricopa County Rule 335, adopted July 13, 1988	Approved effective March 6, 1992, 57 FR 354
Surface Coating Operations	Maricopa County Rule 336, adopted July 13, 1988, revised September 21, 1992, June 19, 1996, April 7, 1999	Approved effective November 19, 1999, 64 FR 50759
Solvent Cleaning	Maricopa County Rule 331, adopted July 12, 1988, revised June 22, 1992, April 7, 1999	Approved effective March 4, 1996, 61 FR 3578; revisions approved effective March 11, 1998, 63 FR 6489; 1999 revisions submitted to EPA on August 4, 1999.
Petroleum Solvent Dry Cleaning	Maricopa County Rule 333, revised July 13, 1988, revised June 22, 1992, revised June 19, 1996	Approved effective March 4, 1996, 61 FR 3578; revisions approved effective March 11, 1998, 63 FR 6489
Cutback and Emulsified Asphalt	Maricopa County Rule 340, revised July 13, 1988, revised June 22, 1992, revised September 21, 1992	Approved effective March 4, 1996, 61 FR 3578
Storage of Organic Liquids at Bulk Plants	Maricopa County Rule 350, revised July 13, 1988, revised April 6, 1992	Approved effective October 5, 1995, 60 FR 46024

Loading Organic Liquids	Maricopa County Rule 351, revised July 13, 1988, revised November 16, 1992	Approved effective October 5, 1995, 60 FR 46024
Transfer of Gasoline into Stationary Dispensing Tanks	Maricopa County Rule 353, revised July 13, 1988, revised April 6, 1992	Approved effective March 4, 1996, 61 FR 3578
Gasoline Delivery Vessel Testing and Use	Maricopa County Rule 352, revised July 13, 1988, revised November 16, 1992	Approved effective October 5, 1995, 60 FR 46024
Graphic Arts	Maricopa County Rule 337, adopted April 6, 1992 revised November 20, 1996	Approved effective October 5, 1995, 60 FR 46024; revisions approved March 11, 1998, 63 FR 6489

### **2.2.2 Source Categories Subject to CTG Adopted Between November 15, 1990 and Attainment–CAA § 182(b)(2)(A)**

<b>Source Category</b>	<b>Maricopa County Rule</b>	<b>Status as SIP Revision</b>
Coating Wood Furniture and Fixtures	Maricopa County Rule 342, adopted November 20, 1996	Approved effective March 11, 1998, 63 FR 6489
Aerospace Manufacturing and Rework Operations	Maricopa County Rule 348, adopted April 4, 1999	Approved effective November 19, 1999, 64 FR 50759

Neither of the other source categories subject to post-November 15, 1990, CTGs—Ship Building and Repair and SOCMR Reactor and Distillation Operations Process—are present in the Maricopa County nonattainment area. As required by the General Preamble, 57 FR 13498, 13512 (April 16, 1992), a negative declaration for these source categories was submitted to EPA in March 2000 (see Appendix B).

### **2.2.3 Source Categories Subject to CTGs Adopted Before November 15, 1990—CAA § 182(b)(2)(B)**

None of the source categories covered by pre-November 15, 1990, CTGs, other than those subject to the RACT fix-up requirement, are present in the Maricopa County nonattainment area. The State submitted a copy of the negative declaration on April 23, 1993, for these source categories pursuant to the General Preamble (see Appendix B).

## **2.2.4 Other Major Sources—CAA § 182(b)(2)(C)**

The following tables address sources with the potential to emit 50 tpy or more of VOCs that are not covered by sections 2.2.1 through 2.2.3.

### **2.2.4.1 Sources Subject to Rule**

<b>Source Category</b>	<b>Maricopa County Rule</b>	<b>Status as SIP Revision</b>
Rubber Sports Ball Manufacturing	Maricopa County Rule 334, adopted June 19, 1996	Approved effective March 13, 1996, 61 FR 5287; revisions approved effective March 11, 1998, 63 FR 6489
Metal Casting	Maricopa County Rule 341, adopted December 16, 1998	Approved effective March 13, 1996, 61 FR 5287
Commercial Bread Bakeries	Maricopa County Rule 343, adopted February 15, 1995	Approved effective May 16, 1997, 62 FR 12544
Semiconductor Manufacturing	Maricopa County Rule 338, adopted November 16, 1992, revised June 19, 1996, revised April 21, 1999	Approved effective March 11, 1998, 63 FR 6489
Vegetable Oil Extraction Processes	Maricopa County Rule 339, adopted November 16, 1992	Approved effective March 11, 1998, 63 FR 6489
Coating Wood Millwork	Maricopa County Rule 346, adopted November 20, 1996	Approved effective March 11, 1998, 63 FR 6489
Ferrous Sand Casting	Maricopa County Rule 347, adopted March 4, 1998	Submitted as SIP revision August 4, 1999; revisions approved effective August 11, 2000, 65 FR 36788
Vitamin Manufacturing	Maricopa County Rule 349, adopted December 16, 1998, revised April 4, 1999	Submitted as SIP revision August 4, 1999 - EPA determined complete on August 25, 1999

#### **2.2.4.2 Sources Subject to RACT Imposed by Permit**

To fulfill the CAA section § 182 (b)(2)(C), Maricopa County proposes to impose source-specific RACT standards in the Title V permits for four major sources of VOC in three industrial categories. A description of the proposal to submit the RACT permit conditions to EPA for approval are in Appendix C of this Plan.

<b>Source Category</b>	<b>Status</b>
Polymeric Foam Products	<p>There are two sources in Maricopa County under this category. Source one underwent a control technology analysis as a result of a modification in 1989. It has permit conditions requiring add-on controls and limiting the VOC content of the raw materials. The initial installation permit was issued under an installation permit program approved August 10, 1988 (53 FR 30220) and its operating permit issued under Rule 220 approved January 6, 1992 (57 FR 354).</p> <p>Source two underwent a control technology analysis at the time of installation in 1993. It also has permit conditions requiring add-on controls and limiting the VOC content of the raw materials. Its installation and operating permits were issued in 1993 under the two permit programs referenced in the previous paragraph.</p>
Fiberglass Boat Manufacturing	<p>The one fiberglass boat manufacturing source in Maricopa County implemented measures to reduce VOCs in 1993, which were included in its operating permit issued in 1993 under Rule 220, as approved January 6, 1992 (57 FR 354). The source reduced VOCs from cleanup and now uses vapor-suppressed resins.</p>
Fiberboard for Expansion Joints	<p>The one source in Maricopa County under this category completed an analysis of fugitive VOCs to determine Title V applicability. In this process, an analysis of control options was completed. The initial review of this analysis concluded that though the source can be enclosed, adding controls to the two-acre enclosure is economically unreasonable. As a result, the source was deemed a major source and applied for a Title V permit. The County will continue to address the issue of controls and feasibility during the Title V permitting process.</p>

### **2.2.5 NO<sub>x</sub> RACT Waiver - CAA § 182(f)**

ADEQ submitted an application for a NO<sub>x</sub> RACT waiver for the Maricopa County ozone nonattainment area. The waiver, contained in the April 1994 Addendum to the Maricopa Association of Government's (MAG) 1993 Ozone Plan for the Maricopa County Area, was granted by EPA on April 11, 1995 (see 60 FR 19510, April 19, 1995). The waiver is still in effect and the State of Arizona has no current plans to petition EPA for its removal.

### **2.3 Gasoline Vapor Recovery - CAA § 182(b)(3)(A)**

On August 27, 1993, The Arizona Department of Weights and Measures (ADWM) adopted Stage II vapor recovery rules, designed to control VOC emissions during the refueling of motor vehicles. ADEQ submitted the rules to EPA as a SIP revision on May 27, 1994. Full approval for the program was granted by EPA effective January 3, 1995 (see 59 FR 54521, November 1, 1994). Subsequent legislative action (HB 2001, 1997) required ADWM to adopt rules to enhance the program. Since then, a quality assurance and quality control program has been implemented by the Department.

### **2.4 1990 Base Year Inventory - CAA § 182(a)(1)(B)**

On April 1, 1993, ADEQ submitted to EPA the 1990 base year emissions inventory for the Maricopa County ozone nonattainment area. Full approval of the inventory became effective on June 26, 1998 (see 63 FR 28898, May 27, 1998).

### **2.5 Comprehensive and Accurate Current Inventory -- CAA §§ 182(3)**

The 1996 base year (July through September 1996) ozone inventory was prepared for three ozone precursors from five source categories. The overall inventory is structured to give an overview of the inventory process, methodologies used, calculations made, data summary tables, and steps taken for quality assurance (see Chapter 3).

### **2.6 Enhanced Vehicle Inspection & Maintenance Program- CAA § 182(c)(3)**

ADEQ has conducted a vehicle emissions inspection program since 1976. The initial components of the enhanced program were submitted to EPA on November 14, 1994. The program began in January 1995, and full approval was effective July 7, 1995 (see 60 FR 22518, May 8, 1995), with interim cutpoints and pressure test. Final cutpoints and the remote sensing program are not credited. ADEQ is in the process of further enhancing the program with final cutpoints for IM 147 to be implemented during the 2000 ozone season. In addition, more stringent gas cap standards were implemented as of February 14, 2000. The enhanced vehicle inspection and maintenance program measures were included in the 1999 Carbon Monoxide Serious Area Plan submitted to EPA on July 8, 1999. The Plan was determined complete by EPA, and is waiting final approval.

### **2.7 NSR Provisions - CAA § § 182(c)(6), (7) and (8)**

To assure adequate SIP revisions required by Section 110(a)(2)(E) of the CAA, the Director of ADEQ is authorized under ARS § 49-402B to assert jurisdiction over major NSR/Prevention of Significant Deterioration (PSD) and minor NSR sources, excluding those located on Indian Reservations. ADEQ submitted a SIP revision on August 15, 1994, containing portions of the State permitting program that are applicable to major sources, major source modifications, and minor

sources. Part of the SIP revision, under a separate cover, included applicable Maricopa County rules pertinent to the NSR program. The amendments to Maricopa County rules 100, 200, 210, 220, 240, and Appendix B were submitted as a revision to the NSR/PSD program; the submittal also requested approval of synthetic minor provisions under Section 112(l) of the CAA. On September 1, 1994, EPA deemed both the ADEQ and Maricopa County SIP revisions complete and each is currently awaiting full approval.

## **2.8 Enhanced Monitoring -- CAA § 182(c)(1)**

The Photochemical Assessment Monitoring Stations (PAMS) network will continue to be phased in over a period of five years in accordance with 40 CFR Part 58.44 and 40 CFR Part 58. The Arizona Department of Environmental Quality 1999 Plan for Photochemical Assessment Monitoring Stations is an annual review and description of the most cost effective and technically sound methods to meet the enhanced ozone monitoring requirements of the federal Clean Air Act. The ADEQ PAMS plan continues to evolve as the PAMS program proceeds through its planning and implementation stages over the next few years. The PAMS plan focuses on the installation and operation of PAMS network sites as identified through an intensive research program of data collection and sampling. ADEQ may be responsible for as many as five PAMS locations and proposes to implement these new PAMS sites during the next two to three years. A copy of the most recent Arizona PAMS Network Plan is on file for public inspection at ADEQ during normal business hours.

## **2.9 CBG as a Substitute for Clean-Fuel Fleet Vehicle Program -CAA § 182(c)(4)**

On December 7, 1998, the State submitted a SIP revision requesting that a portion of the emissions reductions attributable to the State's Cleaner Burning Gasoline program (see 63 FR 6653, February 10, 1998) be approved as an alternate for the Clean-Fuel Vehicles program under CAA § 182(c)(4)(B). The submittal is awaiting approval from EPA.

## **2.10 CAA Requirements Waived**

In a memo dated May 5, 1995, "Reasonable Further Progress, Attainment Demonstration, and Related Requirements for Ozone Nonattainment areas Meeting the Ozone National Ambient Air Quality Standard," EPA specified that a nonattainment area with three consecutive years of monitored attainment is not required to submit the following SIP revisions specified by subparts 1& 2 of part D of Title I of the Clean Air Act (CAA):

- contingency measures (CAA § 182(c)(9))
- verification that Reasonable Further Progress (RFP) has been fulfilled (CAA § 182(c)(2)(B))
- modeled attainment demonstration (CAA § 182(c)(2)(A))
- transportation control measures (CAA § 182(c)(5))

The guidance stipulates that the variance from these CAA requirements exists only for as long as attainment continues to be monitored. In addition, the mobile sources emission budget used to determine transportation conformity for the Maricopa County ozone nonattainment area will be the one contained in the 15% FIP (64 FR 36243) until a new budget is established in the ozone maintenance plan and approved by EPA.



## CHAPTER 3      1996 Base Year Ozone Emission Inventory

### 3.0 Executive Summary

This Ozone Inventory was constructed based on federal requirements stated in the Clean Air Act Amendments of 1990 (CAAA). Title I of the CAAA contains provisions on the required development of ozone and carbon monoxide emission inventories for designated areas that failed to meet the National Ambient Air Quality Standards (NAAQS) for ozone and carbon monoxide. Maricopa County is an ozone nonattainment area classified as serious in 1997. It formerly was a moderate area with a design value of 0.141 ppm.

Maricopa County Environmental Services Department (MCESD) prepared this 1996 base year ozone inventory for three ozone precursors: volatile organic compounds (VOC), carbon monoxide (CO), and oxides of nitrogen (NO<sub>x</sub>). The daily ozone season emissions cover the period from July through September 1996. The sources of emissions are divided into five categories: 1) Point Sources; 2) Area Sources; 3) Nonroad Mobile Sources; 4) Onroad Mobile Sources; and 5) Biogenic Sources. Figures ES-1, ES-2, and ES-3 present the data in three pie charts, one for each pollutant. Table 1-13 in Chapter 1 provides an overview of annual ozone precursor emissions by source type.

***Stationary point sources*** include those sources that emit ten tons or more per year of VOC, as well as those that emit 100 tons or more per year of VOC, CO, or NO<sub>x</sub> and are located within 25 miles of the nonattainment area. A total of 156 point sources were identified in the ozone inventory: 151 point sources are within the nonattainment area and 5 point sources are within 25 miles of the nonattainment area. Individual stationary point sources account for 6.8 percent of the VOC, 18.4 percent of the NO<sub>x</sub> and 0.7 percent of the total CO emissions for an ozone season day.

***Area sources*** are those stationary sources in the nonattainment area that are too small to be considered point sources but are too many to be discounted. Area sources account for 31.5 percent of the VOC, 4.7 percent of the NO<sub>x</sub> and 0.1 percent of the total CO emissions for an ozone season day.

***Nonroad mobile sources*** include aircraft, locomotives, diesel equipment, 4-stroke gasoline equipment, and 2-stroke gasoline equipment in the nonattainment area. Nonroad mobile sources account for 19.2 percent of the VOC emissions, 13.2 percent of the NO<sub>x</sub> emissions, and 49.5 percent of the CO emissions out of the total ozone season day emissions.

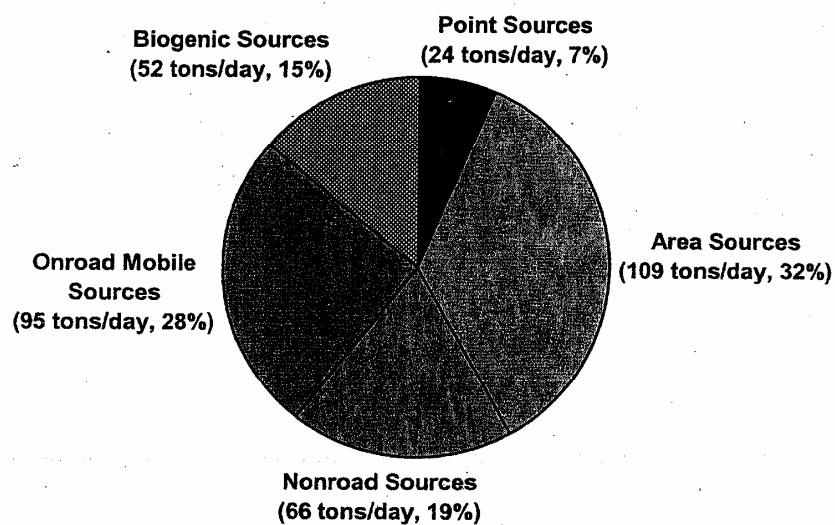
***Onroad mobile sources*** were calculated by the Maricopa Association of Governments (MAG). Emission factors for seven vehicle type categories are calculated using MOBILE 5a, the latest in a series of models developed by the EPA for the purposes of estimating motor vehicle emission factors. Onroad mobile sources account for 27.5 percent of the VOC emissions, 58.9 percent of the NOx emissions, and 49.5 percent of the CO emissions of the total ozone season day emissions.

***Biogenic source*** emissions (emissions from living vegetation) are calculated using the computer model MAG-BEIS2. Biogenic sources account for 15.1 percent of the VOC emissions and 4.8 percent of the NOx emissions out of the total ozone season day emissions.

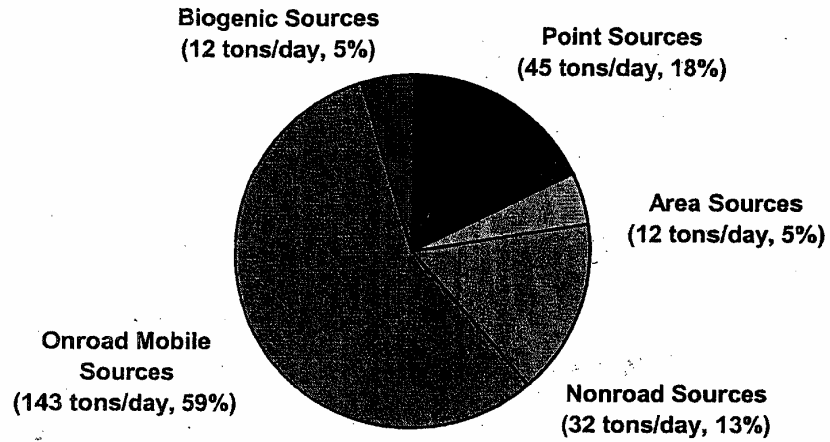
The overall inventory is structured to include an overview of the inventory process, tables of summary data, documentation of data, and quality assurance steps taken. Each section of the inventory is a discrete analysis which includes an introduction, scope, methodology and approach for estimating emissions, subsections with example calculations, and summary.

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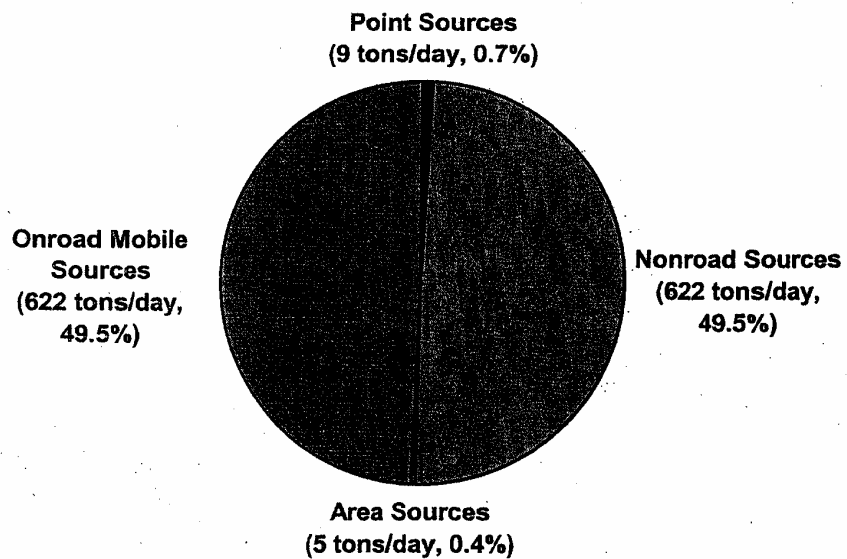
**Figure ES-1. 1996 Ozone Season: Daily VOC Emissions by Category (tons/day)**



**Figure ES-2. 1996 Ozone Season: Daily NO<sub>x</sub> Emissions by Category (tons/day)**



**Figure ES-3. 1996 Ozone Season: Daily CO Emissions by Category (tons/day)**





# Appendix A

## Maricopa county Ozone Nonattainment Area Control Measures

Control Measures contributing to attainment by November 15, 1999

Control Measure	Legislative Authorization and Effective Date
Coordinate traffic signal systems for the Maricopa County nonattainment area	<p>ARS § 9-500.04 (HB 2001, effective February 10, 1994, amended SB 1002, effective July 1, 1997)</p> <p>ARS § 49-474.01 (HB 2001, effective February 10, 1994, amended SB 1002, effective July 1, 1997)</p>
Trip Reduction Program	<p>ARS § 49-474.01 (HB 2001, effective February 10, 1994, amended SB 1002, effective July 1, 1997)</p> <p>ARS § 49-581 (HB 2001, effective February 10, 1994)</p> <p>ARS § 49-588 (HB 2001, effective February 10, 1994, amended HB 2575, effective July 25, 1994, SB 1002, effective July 1, 1997)</p> <p>Maricopa County Ordinance NO. P-7 (adopted July 23, 1997)</p>

<p><b>Basic Vehicle Emissions Inspection Program*:</b></p> <ul style="list-style-type: none"> <li>• Visual anti-tampering check and functional gas cap test</li> <li>• Increased repair threshold limit for waiver</li> <li>• Emissions test for motorcycles</li> <li>• Loaded mode vehicle emission test for pre 1981 vehicles</li> <li>• Fleet requirements</li> <li>• Remote Sensing</li> <li>• One-time waiver from emissions standards compliance</li> <li>• Prohibition of gross polluter waiver</li> <li>• Catalytic converter replacement</li> <li>• Snap Idle Test for Diesel Powered Vehicles</li> <li>• Expansion of Area A</li> </ul>	<ul style="list-style-type: none"> <li>• ARS § 49-542(G) and (H) (HB 2575, effective December 31, 1994; amended by HB 2001, effective January 1, 1995)</li> <li>• ARS § 49-542 (L) (HB 2001, effective January 1, 1995 and SB 1427, effective August 21, 1998)</li> <li>• ARS § 49-542 (F)(3) (HB 2001, effective January 1, 1995)</li> <li>• ARS § 49-542 (F) (2) (HB 2001, effective January 1, 1995)</li> <li>• ARS § 49-542 (F) (6) (HB 2575, effective December 31, 1994, amended by HB 2001, effective January 1, 1995)</li> <li>• ARS § 49-542.01 (HB 2001, effective January 1, 1995, amended by SB 1427, effective August 21, 1998)</li> <li>• ARS § 49-542 (O) (SB 1002, effective January 1, 1997)</li> <li>• ARS § 49-542 (Y) (SB 1427, effective August 21, 1998)</li> <li>• ARS § 49-542 (R) (HB 2001, effective January 1, 1995; amended by SB 1002, effective July 1, 1997)</li> <li>• ARS § 49-542(F) (HB 2001, effective January 1, 1995; amended by SB 1002, effective March 1, 1999)</li> <li>• ARS § 49-541 (SB 1427, effective January 1, 1999)</li> </ul>
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**Enhanced Vehicle Emissions Inspection Program\*:**

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| <ul style="list-style-type: none"><li>• Increased repair threshold limit for waiver</li><li>• Fleet requirements</li><li>• Visual anti-tampering check and functional gas cap test</li><li>• Remote Sensing</li><li>• Enhanced light/heavy duty vehicle emission tests</li><li>• Curb idle test for licensed motor vehicle dealers</li><li>• Prohibition of gross polluter waiver</li><li>• Catalytic converter replacement</li><li>• Snap Idle Test for Diesel Powered Vehicles</li><li>• Expansion of Area A</li></ul> | <ul style="list-style-type: none"><li>• ARS § 49-542 (L)<br/>(HB 2001, effective January 1, 1995, and SB 1427, effective August 21, 1998)</li><li>• ARS § 49-542 (F) (6)<br/>(HB 2001, effective January 1, 1995; amended by HB 2575, effective January 1, 1995)</li><li>• ARS § 49-542 (G) and (H)<br/>(HB 2001, effective January 1, 1995)</li><li>• ARS § 49-542.01<br/>(HB 2001, effective January 1, 1995)</li><li>• ARS § 49-542 (F)<br/>(HB 2001, effective January 1, 1995; amended by HB 2575, effective January 1, 1995)</li><li>• ARS § 542 (F)(2)<br/>(SB 1002, effective March 1, 1997)</li><li>• ARS § 49-542.03<br/>(HB 2001, effective January 1, 1995)</li><li>• ARS § 49-542 (Y)<br/>(SB 1427, effective August 21, 1998)</li><li>• ARS § 49-542 (R) (HB 2001, effective January 1, 1995; amended by SB 1002, effective July 1, 1997)</li><li>• ARS § 49-542(F)<br/>(HB 2001, effective January 1, 1995; amended by SB 1002, effective March 1, 1999)</li><li>• ARS § 49-541<br/>(SB 1427, effective January 1, 1999)</li></ul> |
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Maricopa County Solvent Cleaning Rule 331	<p>ARS § 49-479 (added as § 36-779 by Laws 1967; amended by 1969, 1970, 1973; renumbered as § 49-479 by Laws 1986; amended by SB 1360, effective August 20, 1987; SB 1430, effective September 1, 1993; amended by SB 1384, effective July 17, 1994)</p> <p>ARS § 11-874 (HB 2237, effective July 21, 1997)</p>
Maricopa County Petroleum Solvent Dry Cleaning Rule 333	<p>ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)</p>
Maricopa County Rubber Sports Ball Manufacturing Rule 334	<p>ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)</p>
Maricopa County Architectural and Industrial Coating Rule 335	<p>ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)</p>
Maricopa County Surface Coating Operations Rule 336	<p>ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)</p>
Maricopa County Graphics Arts Rule 337	<p>ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)</p>

Maricopa County Semiconductor Manufacturing Rule 338	ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)
Maricopa County Vegetable Oil Extraction Processes Rule 339	ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)
Maricopa County Cutback and Emulsified Asphalt Rule 340	ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)
Maricopa County Metal Casting Rule 341	ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)
Maricopa County Woodcoatings industry Rules 342 & 346	ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)  ARS § 11-872 (HB 2001, effective February 10, 1994, amended HB 2575, effective April 26, 1994)  ARS § 11-874 (HB 2001, effective February 10, 1994, amended HB 2237, effective July 21, 1997)
Maricopa County Windshield Washer Fluid Rule 344	ARS § 11-874 (HB 2001, effective February 10, 1994, amended HB 2237, effective July 21, 1997)

Maricopa County Ferrous Sand Casting Rule 347	ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)
Maricopa County Vitamin Manufacturing Rule 349	ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)
Organic Liquids Maricopa County Bulk Plants Rule 350	ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)
Maricopa County Loading of organic liquids Rule 351	ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)  ARS § 11-873 (HB 2001, effective February 10, 1994)
Maricopa County Gasoline Delivery Vessel Testing and Use Rule 352	ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)
Maricopa County Transfer of gasoline into stationary storage dispensing tanks Rule 353	ARS § 49-479 (added as § 36-779 by Laws 1967, amended 1969, 1970, 1973, renumbered as § 49-479 by Laws 1986, amended SB 1360, effective August 20, 1987, SB 1430, effective September 1, 1993, amended SB 1384, effective July 17, 1994)  ARS § 11-873 (HB 2001, effective February 10, 1994)

Stage II Vapor Recovery	<p>ARS § 41-2134 (HB 2001, effective February 10, 1994)</p> <p>ARS § 41-2132 (SB 1427, effective August 21, 1998)</p>
Arizona Cleaner Burning Gasoline Program	<p>ARS § 41-2124 (HB 2307, effective April 20, 1997)</p> <p>ARS § 41-2124.01 (HB 2307, effective April 20, 1997)</p>
Clean Air Campaign	<p>ARS § 49-551 (HB 2575, effective January 1, 1995)</p>
Maricopa County's Voluntary lawnmower and lawn and garden recycling programs	<p>ARS § 49-474.02 (HB 2237, effective July 21, 1997, amended SB 1427, effective August 21, 1998)</p>
Allow Use of High Occupancy Vehicle Lanes and Freeway Ramps by Alternative Fueled Vehicles	<p>ARS § 28-2416 (added as ARS § 49-385 by SB 1002, effective April 1, 1997, renumbered as ARS § 28-2416)</p>

\*Pre-1990 legislative authorization for the basic I/M Program include HB 2206, enacted in 1988; HB 2014, effective January 1, 1989; and SB 1176, enacted in 1989.